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# AGRICULTURE APPROPRIATION BILL

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## HEARINGS

BEFORE THE

## COMMITTEE ON AGRICULTURE

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HOUSE OF REPRESENTATIVES

SIXTY-FOURTH CONGRESS

SECOND SESSION

ON THE

## AGRICULTURE APPROPRIATION BILL

—  
BUREAU OF SOILS  
—

Monday, December 11, 1916



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# AGRICULTURE APPROPRIATION BILL.

HOUSE OF REPRESENTATIVES,  
COMMITTEE ON AGRICULTURE,  
*Monday, December 11, 1916.*

## BUREAU OF SOILS.

### STATEMENT OF MR. MILTON WHITNEY, CHIEF OF THE BUREAU OF SOILS, UNITED STATES DEPARTMENT OF AGRICULTURE.

The CHAIRMAN. Now, we will take up the Bureau of Soils, on page 127 of the Book of Estimates. Dr. Whitney is here to present his estimates.

Doctor, your first matter is the question of your statutory roll, and the first suggested change is found in item 2, page 127, where you have increased the amount of the salary of the chief clerk \$220. Just give us a very brief statement and explain the reason for that.

Mr. WHITNEY. Mr. Chairman, there are two such increases asked for, simply on the ground of justice to the men. These men have been in the service for a long while; they are very efficient, and we are increasing our entrance salaries to such a point now that whereas we give a person \$1,000 to come into the service we are giving our higher grade clerks only \$1,800, and in one case it is \$2,000. Now, the difference between \$1,000 for an entrance salary and \$1,800 for a man who has spent his life in the department and who is qualified to take supervisory work and be really an executive clerk is only \$800. It seems to me that we are justified in asking for an increase for these more efficient clerks.

The CHAIRMAN. Doctor, I notice your first clerk has been in the department for 20 years and has held his present position without promotion for 15 years. I take it, of course, that this man must be a very efficient man.

Mr. WHITNEY. He is.

The CHAIRMAN. How old a man is he?

Mr. WHITNEY. Now, that is hard for me to say.

The CHAIRMAN. Approximately.

Mr. WHITNEY. A young man.

The CHAIRMAN. About my age, then?

Mr. WHITNEY. Oh, yes, sir.

Mr. McLAUGHLIN. He has had no promotion and has had no increase in salary?

Mr. WHITNEY. No, sir. The other case is that of Mr. Seaton.

Mr. McLAUGHLIN. That is item 4?

Mr. WHITNEY. Yes, sir. He has been 22 years in the department and it has been 13 years since he has had any increase of salary. He



is now getting \$1,800, and he is a very efficient man. He is in charge of the editorial section of the bureau, editing all the reports, being responsible for the manner of treatment of each report. He does very efficient work.

The CHAIRMAN. All right, Doctor. Your next change is in item 20, where there seems to be a transfer of one laboratory helper from the lump fund for investigation of fertilizer resources. Is that at the same salary?

Mr. WHITNEY. Yes, sir.

The CHAIRMAN. Has the lump fund been reduced?

Mr. WHITNEY. It has been reduced.

The CHAIRMAN. What do you say to item 21?

Mr. WHITNEY. It is the same thing. The lump fund has been reduced.

The CHAIRMAN. Is that all, Doctor?

Mr. WHITNEY. That is all the changes.

The CHAIRMAN. Very good.

Mr. McLAUGHLIN. Pardon me. The doctor spoke of the salary at the beginning of work and he named \$1,000 as the salary. I see there are five clerks at \$900. Evidently there is a lower grade than you spoke of.

Mr. WHITNEY. Yes; but we are finding it exceedingly difficult to get people in at those salaries. We are finding it very difficult to get people in at less than \$1,000.

Mr. McLAUGHLIN. I should think you would at the present time.

Mr. WHITNEY. Yes.

Mr. McLAUGHLIN. There are some in item 11, five clerks at \$900, who have been in that position and drawn that salary for a long time.

Mr. WHITNEY. Yes; there are some who have been there quite a while, but those I have in mind came in a number of years ago before the Civil Service covered all of these positions. They came in at \$50 a month, \$600 a year, and they have been promoted from time to time. I think it was last year or the year before when our lower grade clerks were raised to \$900.

Mr. HELGESON. The men are not interested so much in the amount they get as they are in being promoted?

Mr. WHITNEY. No; they are interested in both, I think.

Mr. HAUGEN. What is the character of the work?

Mr. WHITNEY. Routine work.

Mr. HAUGEN. Field work?

Mr. WHITNEY. No, sir; clerical work, routine clerical work.

Mr. HELGSEN. I do not see how you can get men to do clerical work and do it intelligently for \$900 a year.

Mr. WHITNEY. Most all of them are women.

Mr. HELGESEN. But if they do efficient work they are worth as much as men.

Mr. WHITNEY. Oh, yes, sir. We could get them at \$50 a month in Washington, if we could take them from the district, but we have to apportion them all over the country, and you can not get people here from Montana, for instance.

Mr. HAUGEN. We occasionally have to get along without a corn crop in Iowa, and it is hard to get along; it is rather difficult to get along. Some of our farmers have a hard enough time getting \$50 a month.

Mr. McLAUGHLIN. Well, just because some fellow has hard luck is no reason why the Government should ask a clerk to work for a low salary.

Mr. HAUGEN. It is a question of whether you are going to tax the people who do not get anything to pay for the fellows who are in hard luck.

Mr. WHITNEY. I would be very glad to see the entrance salary raised, but I would also be very glad to raise the salaries of these efficient clerks who have been in the department so long.

Mr. STEELE. Are you also in favor of putting an embargo on the farmers' products?

The CHAIRMAN. Iowa is heard from again. All right, Doctor. Your next item is number 30, on page 128, for chemical investigations of soil types, soil composition, and soil minerals, and so forth. You ask an increase of \$5,000. Tell us about that increase.

Mr. WHITNEY. I have Dr. Shorey here, and I would like to have him explain that, if you would like to hear him.

The CHAIRMAN. We shall be very glad to hear him.

**STATEMENT OF DR. E. C. SHOREY, BIOCHEMIST IN CHARGE OF  
SOIL-CHEMICAL INVESTIGATIONS, BUREAU OF SOILS, UNITED  
STATES DEPARTMENT OF AGRICULTURE.**

Dr. SHOREY. Mr. Chairman, I think the reason for this increase is rather explicitly stated in the estimates. The \$5,000 is covered in three items—\$2,000 to be devoted to increase of facilities for making analyses of soils that are required by the soil survey, \$1,000 for increase of facilities for doing what we call routine work; that is, analytical work that is requested by other bureaus of the department and sometimes by other departments. This work has been growing from year to year without any increase in the appropriation. Last year we used for routine work about one-third of the appropriation for chemical investigations.

Mr. McLAUGHLIN. In the note on page 129 you say you want \$1,000 to meet the increasing demands from other bureaus of the department for routine analytical work. There is no part of that work, I suppose, in connection with the Forestry Bureau where your bureau cooperated for the purpose of ascertaining the quality of the soil in the forest areas?

Dr. SHOREY. The work that comes under that head comes from nearly all the other bureaus of the department, occasionally from the Forest Service, but mostly from the Bureau of Plant Industry and the Office of Roads and Rural Engineering.

Mr. McLAUGHLIN. There is a separate appropriation for that work?

Mr. WHITNEY. Yes; there is a special appropriation for examination of lands in cooperation with the Forest Service.

The CHAIRMAN. Then there is \$2,000 to extend investigations in the liming of soils.

Dr. SHOREY. There is \$2,000 proposed to be spent on a project entitled "liming of soils." There is a great deal of interest being shown just now in the agricultural use of lime, the treatment of the soil with lime. Some investigational work is now being carried on

with a view to ascertaining the chemical changes brought about by liming the soil, and it is desired to extend this investigation.

The CHAIRMAN. Was there any increase in this item last year?

Dr. SHOREY. No, sir.

The CHAIRMAN. How long has this item stood at this figure?

Dr. SHOREY. I think it has been at the same figure for four years.

**STATEMENT OF MR. MILTON WHITNEY, CHIEF OF THE BUREAU OF SOILS, UNITED STATES DEPARTMENT OF AGRICULTURE—**  
Continued.

The CHAIRMAN. Dr. Whitney, item 31 is for physical investigations of the important properties of soil. There seems to be no change in that item.

Mr. WHITNEY. There is no change there.

The CHAIRMAN. That is research work?

Mr. WHITNEY. Research work; yes.

The CHAIRMAN. And you have been continuing it along the same lines that you have been doing it for some years?

Mr. WHITNEY. Yes, sir.

The CHAIRMAN. I will ask you, as I asked Dr. Alsberg, to summarize for us in the record your work for the present year, and if you have discovered any striking things that ought to be brought to the attention of the committee, just give that to us. I will not ask you to do it here, because we are trying to save time, but put it in your statement.

Mr. WHITNEY. I will be glad to do it.

The CHAIRMAN. Item 32, on page 130, for exploration and investigation within the United States to determine possible sources of supply of potash, nitrates, and other natural fertilizers, \$33,380, which is an apparent but not an actual decrease.

Mr. WHITNEY. Yes, sir.

The CHAIRMAN. Doctor, in looking over these estimates the other night I was wondering if the time is not pretty near when you can reduce that item very materially. You have about as much information about potash, I suppose, as you will ever get. These things seem to be taking a very definite shape.

Mr. WHITNEY. Of course, the potash situation has narrowed down to a certain point. We have a special appropriation to look after that. The utilization of phosphates, the preparation of phosphoric acid, and the combination of that with other elements, while it is in a well-advanced state, is far from completed; it is at the point where we have a pretty comprehensive view of what is ultimately to be done and we want to finish it, which will depend upon the readjustment after the present unsettled conditions have been solved.

The CHAIRMAN. Are you continuing under this item, Doctor, to undertake to locate different sources of potash, nitrates, and phosphates, and the like?

Mr. WHITNEY. No; it is more the utilization of those we have found.

The CHAIRMAN. The original purpose of this item was to enable the department to see if they could discover any sources of fertilizers in this country.



Mr. WHITNEY. Yes, sir; to discover or develop such sources.

The CHAIRMAN. You are somewhat getting away from the purpose of the item and going into a study of the utilization of these fertilizers.

Mr. WHITNEY. I think it is rather a culmination of our earlier work in a further study of the possibilities of utilizing what we have found. It is the possibilities now of utilizing what the original work showed us to exist. I think that is answering the question.

Mr. HAUGEN. Were these kelp beds discovered by your people?

Mr. WHITNEY. Yes, sir. We first called attention to them.

Mr. HAUGEN. What progress are we making?

The CHAIRMAN. Let us wait until we get to that item.

Mr. HAUGEN. Well, this deals with nitrates, and I thought it was the same thing.

Mr. WHITNEY. Now, at the same time, Mr. Chairman, we went into the study of phosphates, the possibility of utilizing low-grade phosphates, the possibility of putting to practical use the material that is now being thrown away in vast quantities, millions of tons being thrown away on the dump heaps. Now, we have really discovered those things, but the discovery is of no use until we have seen whether our discovery is of any practical value. We are working on the possibilities of utilizing these things we have found in order that we may come here and say that we have done so-and-so.

Mr. HAUGEN. Have you discovered any new source of supply recently?

Mr. WHITNEY. Well, we have the potash situation now well in hand. In the nitrate situation we are cooperating with the War Department and the Bureau of Mines in the study of the possibility of using atmospheric nitrogen.

Mr. HAUGEN. And that has been disposed of. We made an appropriation, and a plant is to be established.

Mr. WHITNEY. Yes; an appropriation was made.

Mr. HAUGEN. And that is a thing of the past. That has gone beyond the experimental stage.

Mr. WHITNEY. No; I beg your pardon. We are experimenting for the purpose of advising them. That plant has not been established yet. The work that we did at Arlington has been utilized, and some of the apparatus we had there has been shipped to Syracuse, and one of our men is working with the War Department, the Bureau of Mines, and the Solvay Co. on that problem.

Mr. HAUGEN. Doctor, can you state definitely what we have accomplished at Arlington?

Mr. WHITNEY. Yes, sir.

Mr. HAUGEN. If I am not taking up too much time, Mr. Chairman.

The CHAIRMAN. No. Doctor, you are paying for the Arlington work out of this fund?

Mr. WHITNEY. Yes. I have Mr. Brown here, who is in charge of that work, and I would like to have him explain it.

The CHAIRMAN. All right, Mr. Brown.

Mr. HAUGEN. Give us the results that have been accomplished.

STATEMENT OF MR. F. W. BROWN, ASSISTANT IN CHARGE OF INVESTIGATIONS OF FERTILIZER RESOURCES, BUREAU OF SOILS, UNITED STATES DEPARTMENT OF AGRICULTURE.

Mr. BROWN. Mr. Chairman, so far as nitrogen is concerned, we have investigated the process, which is well known in Europe but the details of which are not known in this country, for oxidizing by-product ammonia to produce nitric acid and nitrates. We put up an apparatus—I think it was the first in operation in this country—and had it working, and we were actually producing nitric acid. Then the \$20,000,000 bill was passed, and the War Department, in cooperation with the Bureau of Mines, the Bureau of Soils, and the Solvay Chemical Co., set up a large experimental plant in one of the buildings of the Solvay Co. We scrapped our plant and shipped part of it to the site of the cooperative plant. We have the balance of it—I do not mean to say that we scrapped it all. We can use it if it is necessary.

Mr. HAUGEN. Where did you transfer it?

Mr. BROWN. To Solvay, N. Y., to the chemical company there.

Mr. HAUGEN. They carry it on at New York?

Mr. BROWN. Yes, sir. Not on a laboratory scale, but on a large scale, producing nitric acid by the ton.

Mr. HAUGEN. It is a large plant?

Mr. BROWN. Yes.

Mr. HAUGEN. I have reference to the \$20,000,000 plant.

Mr. BROWN. That is not the \$20,000,000 plant. There is nothing official about it, so far as I know, but I understood that it was being partly financed by the War Department out of the \$20,000,000 fund, though I can not state definitely.

Mr. HAUGEN. But that is simply an experiment?

Mr. BROWN. A preliminary investigation.

Mr. HAUGEN. Has the department decided on a location?

Mr. BROWN. I do not know. So far as phosphoric acid is concerned we have a very interesting experiment, and I believe a very important one, which we have completed in the last six months, and that is the electrical treatment of phosphate rock, or the smelting of phosphate rock in an electric furnace and the collection of the phosphoric acid by means of electrical precipitation.

Mr. HAUGEN. Have you discovered anything or made any new discoveries?

Mr. BROWN. Yes.

Mr. HAUGEN. This is absolutely new?

Mr. BROWN. This is absolutely new. This has never been done anywhere else in the world except at our plant at Arlington. Now, we have collected acid there which is purer than any chemically pure acid we can buy in the market for experimental purposes. We get it 99  $\frac{89}{100}$  per cent pure and so concentrated that when it is drawn into a container and cools it crystallizes into a solid.

Mr. STEELE. When you shipped the experimental machinery that you had, did you send the plans and specifications along with it?

Mr. BROWN. I sent a man along with it. I have a man cooperating and he took our plans and part of our apparatus with him.



Mr. HAUGEN. So that the three of you are cooperating in this work?

Mr. BROWN. The Solvay Co., the War Department, the Bureau of Mines, and the Bureau of Soils.

Mr. HELGESEN. What is this company, a private corporation?

Mr. BROWN. Yes, sir. They own patents on the purification of by-product ammonia.

Mr. McLAUGHLIN. Is that at Syracuse?

Mr. BROWN. It is just outside of Syracuse.

Mr. HAUGEN. I do not know that I am very clear as to what we are getting out of Arlington.

Mr. BROWN. In regard to potash, we have been conducting examinations and investigations last year with samples of cement from all over the United States. There are two or three plants that are collecting flue dust by means of the electrical precipitator and selling it right to the trade on a percentage basis for its potash content.

Mr. HAUGEN. Now, that is what they are doing. What are we doing?

Mr. BROWN. It is probable that most of the cement manufacturers in the United States are volatilizing potash; that it is passing off into the air, and it is a matter that they should be shown.

Mr. HAUGEN. And you would show them?

Mr. BROWN. We are showing them now. We have secured in the last few weeks, or the last month or so, information which showed that one company is volatilizing over \$1,000,000 of potash from their plant. I am going up to see them in a few days to have a conference with their representatives.

Mr. HAUGEN. Is that due to your investigations?

Mr. BROWN. Not to mine, but to those of Dr. Ross.

Mr. HAUGEN. I mean not personally, but the bureau.

Mr. BROWN. Yes.

Mr. HAUGEN. It is something entirely new?

Mr. BROWN. Something new.

Mr. HAUGEN. And it is a discovery made by the department?

Mr. BROWN. No. The discovery was made out at Riverside, Cal., where a cement mill was compelled to put in one of these precipitators to protect the orange groves from the dust. Many other mills have not taken it up yet. We have got samples from all over the country and we are determining exactly the amount that is being lost from any one mill, and we can then call the attention of the manufacturer to the fact that he is throwing it away.

Mr. HAUGEN. Then you feel you have been of some service to these manufacturers?

Mr. BROWN. Yes.

Mr. HAUGEN. Can you state to what extent—the saving of how many millions of dollars did you say?

Mr. BROWN. Well, one concern is now volatilizing about \$1,000,000 worth of potash, at the present price of potash.

Mr. HAUGEN. As a result of your investigations?

Mr. BROWN. No; but as a result of our investigations we have shown them that they were doing that. They are not saving it yet, but they will.

Mr. HAUGEN. Do all cement plants use about the same amount of potash?

Mr. BROWN. No. It all depends. Some of them use slag and do not get any potash. For instance, there is one plant operating at Duluth and using a precipitator which secures no potash at all in the dust.

Mr. OVERMYER. Do you know anything about the plants in northern Ohio?

Mr. BROWN. No; I do not.

The CHAIRMAN. Anything further? If not, Dr. Whitney, take up item 33, for the investigation and demonstration within the United States to determine the best methods of obtaining potash on a commercial scale, including the establishment and equipment of such plant or plants as may be necessary therefor, \$175,000. That item seems to be dropped. At this point I think it well to read a letter just received from the Secretary of Agriculture under date of December 7, 1916.

(The letter referred to follows:)

DECEMBER 7, 1916.

Hon. A. F. LEVER,

*Chairman Committee on Agriculture, House of Representatives.*

DEAR MR. LEVER: No estimate has been submitted for the operation of the experimental plant for the extraction of potash from kelp, which was authorized by the Agricultural appropriation act for the fiscal year 1917. Arrangements have been made for a certain degree of cooperation with one of the companies now operating on the coast, with the result that the expenses for operating the Government plant will be somewhat less than originally estimated. It will, for instance, be unnecessary for us to build or purchase a harvester at present, though ultimately this may become necessary if we decide to increase the output of the plant. A site has been secured which already contains a wharf. Some repairs will be necessary upon this, but it will not be necessary for us to build a wharf. Also we propose to start operations with 200 tons of wet kelp per day, ultimately going to 400 tons if it is apparent that more efficient operation can be carried on with the latter amount. Taking these things into consideration, together with the fact that until the plant is in actual operation it is extremely difficult to estimate the sum of money necessary for its operation, it seems wiser to defer a request for a further appropriation for operation until some time during the fiscal year 1918, when it is hoped that if it is necessary to secure additional funds to keep the plant in operation a definite statement of costs of operation can be presented. It is desirable, however, that such portion of the appropriation for the current fiscal year as remains unexpended on June 30, 1917, shall be reappropriated and made available until expended. To accomplish this it is requested that the following language be inserted in the bill:

"That so much of the appropriation of \$175,000 made by the Agricultural appropriation act for the fiscal year 1917 for the investigation and demonstration within the United States to determine the best method of obtaining potash on a commercial scale, including the establishment and equipment of such plant or plants as may be necessary therefor, as remains unexpended is hereby reappropriated and made available until expended for the purposes named."

Very truly, yours,

D. F. HOUSTON, *Secretary.*

Mr. McLAUGHLIN. How much is that remainder?

The CHAIRMAN. That is the reason I read the letter. I want to ask Dr. Whitney.

Mr. WHITNEY. Would you like Mr. Brown to answer that?

The CHAIRMAN. Yes.

Mr. BROWN. The amount expended is very small, indeed—a few hundred dollars. When the appropriation became available last August it seemed advisable, before going ahead with the Government plant, to have a complete examination and investigation made

of the situation on the coast among the private plants in operation. Dr. Turrentine was sent to the coast and spent six weeks or more in investigating six or eight larger plants that are now operating. As a result of his investigations it became evident that none of those companies can probably continue operations after a return to normal conditions without a radical change in the system and methods they are using to treat the kelp. Accordingly a Government plant seemed to be justified, and we have proceeded with the plans. So far a site has been selected, after careful consideration, which contains a wharf, as stated in the letter that was read, so that we will not be required to build a wharf, and a plan of cooperation has been worked out with one of the large companies operating there.

Mr. HAWLEY. Have you an option on that site?

Mr. BROWN. Yes, sir. A plan of cooperation has been worked out by which we will have certain advantages; we can either buy our wet kelp from them practically at cost, or we can rent a harvester from them, so that it may be unnecessary to buy a harvester or build one. That is about the extent of the situation so far, except that we have advertisements out for bids on some of the machinery. The actual expenses have been limited to a few hundred dollars for salary and expenses of Dr. Turrentine to the coast and return.

Mr. HAUGEN. Can you estimate the cost of manufacture?

Mr. BROWN. Not a bit better than I could last year. The plants that are operating out there are operating on the basis of \$475 a ton for potash. We have got to get it down somewhere in the neighborhood of \$40.

Mr. HAUGEN. You say four hundred and some dollars a ton?

Mr. BROWN. The last price listed was \$475 wholesale price of potash, and they are not paying due attention to costs of production.

Mr. HAUGEN. But after all there is a cost to it.

Mr. BROWN. Yes; there is a cost. One of those concerns gave us figures which showed a cost of \$18 a wet ton to harvest the kelp. Of course, that is ridiculous. It can probably be harvested for one-tenth of that sum.

Mr. HAUGEN. The figures given a year ago will have to be revised somewhat.

Mr. BROWN. Well, they will certainly have to be revised on that basis, but I think that is away off. I think they have charged up to harvesting some costs that ought not to go there.

Mr. HOWELL. Have you any idea as to what the actual manufactured article of potash is costing to produce?

Mr. BROWN. No; I can not say. I know approximately what they are selling it for, but that does not show anything about the cost.

Mr. HAUGEN. Yes; but some one last year estimated the cost. I do not know just exactly what it was.

Mr. BROWN. I have the figure.

Mr. HAUGEN. They were very much lower.

Mr. BROWN. I think they can be made very much lower, and other operators are harvesting it at very much less than that, but there is no standard of cost, and it is impossible to give any record figure.

Mr. WHITNEY. My understanding, Mr. Haugen, is that one of the larger companies estimates that it is costing them \$75 a ton for the potash they produce. Included in that is an item of \$85 a day for



fuel oil, and that is one of the items we want to reduce. They are burning their kelp and letting all their heat escape. Now, through our method of procedure, we want to utilize the heat and save the fuel. We also want to collect some of the by-products. They are letting the nitrogen escape. We hope to get it as ammonia. They are letting all the iodine escape; they are letting all the by-products escape; they are paying no attention to those things. It is those things that are going to pay the cost of manufacture to a large extent. We can not say much more definitely until we see how the things work out in practice.

Mr. HAUGEN. But you expect to reduce the cost by some improved process?

Mr. BROWN. Yes, sir.

Mr. McLAUGHLIN. I do not quite understand what you are going to do by way of cooperation, and what you are going to do yourself.

Mr. BROWN. We are going to have a building of our own, absolutely independent of anybody, Mr. McLaughlin. We are going to have our own handling apparatus for handling the kelp from the barges to the plant and through the plant.

Mr. McLAUGHLIN. And your own machinery?

Mr. BROWN. Yes; our own machinery, our own laboratory, and our own office.

Mr. McLAUGHLIN. Where does the cooperation come in?

Mr. BROWN. We are cooperating to the extent of agreeing to take the surplus kelp from those people and buy from them or rent from them one of their harvesters.

Mr. HOWELL. Is this the company that places an estimate of \$18 a ton?

Mr. BROWN. No, sir.

Mr. HAUGEN. In ascertaining the cost I should think you would have to estimate from beginning to end.

Mr. BROWN. Well, it will have to be worked out, and we may have to do our own harvesting in the end.

Mr. HAUGEN. Well, it can not be worked out satisfactorily if one man figures it at \$18 and another at \$40, and so on.

Mr. BROWN. It has not been worked out satisfactorily yet.

The CHAIRMAN. How much are you going to pay for this site, or is it donated?

Mr. BROWN. No; we are not buying the site outright. We are renting it from the company with which we are going into cooperation.

The CHAIRMAN. What is the rent? A nominal rent?

Mr. BROWN. A nominal rent. The figure has not been fixed, but we have an agreement with the company that it will be nominal.

Mr. HAUGEN. What is the cost of a harvester?

Mr. BROWN. That will run from \$15,000 to \$20,000.

Mr. HAUGEN. The harvester?

Mr. BROWN. Yes; the harvester. It is a great big boat with a lot of machinery.

Mr. HAUGEN. What is the cost of the machinery?

Mr. WHITNEY. And besides that the barges cost \$9,000 apiece.

Mr. McLAUGHLIN. After that stuff is cut and harvested, how long does it take to grow again to be ready for cutting?

Mr. BROWN. They cut the beds down so closely this summer near San Diego that they had to stop cutting. The beds came back again in three months and could be cut again.

Mr. HOWELL. Wherever the Government ceases to continue to extract kelp, I presume those buildings and all this apparatus will revert to the company?

Mr. BROWN. No. We have an arrangement that they shall not.

Mr. HAUGHTON. What is the cost of the machinery?

Mr. BROWN. I can estimate roughly, and only roughly. We propose to put in a battery of three driers and they will cost from \$4,000 to \$5,000 apiece.

Mr. HAUGEN. How many will you need?

Mr. BROWN. We will need three to start with, and if we go to a heavier tonnage basis later on we shall need five.

Mr. HAUGEN. What would be the capacity of three?

Mr. BROWN. Three would handle 200 tons of kelp a day.

Mr. HAUGEN. Wet kelp?

Mr. BROWN. Wet kelp; yes, sir.

Mr. HAUGEN. Dried, how much would it be?

Mr. BROWN. It will give you about 20 tons.

The CHAIRMAN. Doctor, your recommendation here is to study the situation thoroughly before you begin to expend this appropriation?

Mr. BROWN. No; we are actually issuing proposals for bids right now. We propose to erect that plant and get it going just as quickly as we can. I hope to have the men out there and have the plant going up by February. Then, I think that the reductions in the original estimates, due to this cooperative feature that we have and due also to the fact that we are going to attack the problem with a 200-ton a day plant instead of a 500-ton a day plant, as we anticipated at first, we will certainly be able to go forward until some time next winter with the appropriation we now have, provided it is extended and made available until expended.

Mr. HAUGEN. What is the market value of the dried kelp?

Mr. BROWN. \$75 per ton. Only one company is marketing dry kelp; the others are burning it and marketing the ash.

Mr. HAUGEN. You stated it cost \$18 a ton.

Mr. BROWN. That is just the harvesting cost.

Mr. HAUGEN. Yes; but the cost is over \$150 a ton.

Mr. BROWN. For the high-grade muriate they can get anywhere up to \$500 a ton.

Mr. HAUGEN. What is the normal price?

Mr. BROWN. \$40; that is, 80 per cent muriate.

Mr. HAUGEN. But with your estimate it would cost over \$150 a ton, saying nothing about the manufacture.

Mr. BROWN. I think it is quite possible it is costing that much at present, Mr. Haugen.

Mr. HAUGEN. What I am getting at is this, if it is going to cost \$150 a ton to manufacture an article worth \$50 a ton—

Mr. BROWN. It is not, Mr. Haugen. It is not going to cost that, certainly, because we are going to have by-products to offset this cost of manufacture, and we are going to use more efficient methods and apparatus. Burning the kelp in the open, the nitrogen is going

off and part of the potash is lost, and present operators are conserving none of the heat evolved in the reaction. Those things we propose to save, and it is the only basis on which I think we can get by on the proposition.

Mr. HAUGEN. Is it not possible to make some test before you go into this?

Mr. BROWN. We have made laboratory tests. We gave you the closest estimates we could last year, based on those and on observation in the field. We think we can do it. I think we have a margin of profit, but it has got to be done on a commercial scale before we can determine that fact.

Mr. WHITNEY. The figures we have for harvesting are very high. Some of the companies are harvesting the kelp and I think are doing it for—

Mr. BROWN. Less than \$2—\$1.50, \$1.75, or something like that, and some for as low as 75 cents.

Mr. McLAUGHLIN. Wet kelp?

Mr. BROWN. Harvesting the wet kelp.

Mr. HAUGEN. The thought I had in mind was this: If we can investigate the probable cost before we go ahead into the proposition, I think that is the general way of doing things.

Mr. BROWN. As the thing is being done now, they can not continue it after normal conditions return, in my judgment.

Mr. WHITNEY. Mr. Haugen, as I recall the original estimates, Dr. Cameron gave it, was about \$20 a ton for manufactured muriate of potash. Whether we can actually do it for as little as that is doubtful, but we think it can be done for between \$30 and \$40 a ton.

Mr. HAUGEN. You believe it can be done for \$30 to \$40 a ton?

Mr. WHITNEY. Yes.

Mr. HAUGEN. That is what I was getting at.

Mr. BROWN. That is, considering the by-products.

Mr. McLAUGHLIN. You have perfected a method by which you save the ammonia. You spoke of that as one of the by-products.

Mr. BROWN. As one of the by-products.

Mr. McLAUGHLIN. Have you done anything by way of ascertaining whether you can save the iodine?

Mr. WHITNEY. Yes. That can be saved, and the heat can be utilized, which is probably one of the greatest assets that is not now being used.

Mr. McLAUGHLIN. What can you do with the heat?

Mr. WHITNEY. Use it in the plant for drying kelp.

Mr. BROWN. Use it in the plant for drying kelp; and there will be tars and there will be charcoal.

Mr. McLAUGHLIN. You have to have a boiler plant for drying the kelp anyway?

Mr. BROWN. Not a boiler plant; we will have rotary hot-air driers, which we propose to use.

Mr. McLAUGHLIN. You have to have boilers to make the heat, and then have the rotary driers?

Mr. BROWN. We shall use the combustible gas, so far as it will go, in our retorts, and then the excess we will use in our driers. We shall have to use oil fuel in our driers, because we will not have enough of the others, but we will have tars and ammonia, and we



will also have charcoal. If we can not sell the charcoal and tar we can briquet these two and use them as fuel.

The CHAIRMAN. Doctor, if I am asked a question, or any of the members of the committee, on the floor, as to what you have done so far with this \$175,000 appropriation and what you expect to do with the balance of it, what would be my answer to that question?

Mr. BROWN. We have secured a site at Santa Barbara, and we have secured concessions from the county authorities to give us exclusive rights to certain kelp beds. We have investigated the plants now operating and have found that they can not in all probability operate under normal conditions, and we are going ahead with the erection of the plant.

The CHAIRMAN. But you have determined in your own mind that it is possible to manufacture potash on a commercial scale out of kelp; if not, you are determined in your own mind that it is wise to spend \$175,000 in finding out?

Mr. BROWN. In finding out. I think you will bear me out that I told you last spring that I could not say, and I did not think any man could say, whether this could be done or could not be done, but that it would be worth while to find out that fact?

The CHAIRMAN. Yes. And where have you located your plant?

Mr. BROWN. We have located the plant in Santa Barbara County.

The CHAIRMAN. How far up the coast is that?

Mr. BROWN. About 150 miles, I should say, north of San Pedro.

The CHAIRMAN. You found that to be a better location than San Diego?

Mr. BROWN. It has advantages over either San Diego or Long Beach that have finally caused us to decide to go there.

Mr. HAWLEY. How much did you pay for the land?

Mr. BROWN. We did not pay anything.

Mr. HAWLEY. How long does your lease run?

Mr. BROWN. We have not signed a lease. We have an agreement with the president of this company we are cooperating with. We shall have a site there for nominal rent as long as we want it.

Mr. McLAUGHLIN. It is near Santa Barbara?

Mr. BROWN. Within 7 miles of Santa Barbara.

Mr. HAUGEN. I infer from what you say that you are not as enthusiastic over this proposition as you were a year ago?

Mr. BROWN. Yes; I am just exactly as enthusiastic.

The CHAIRMAN. Now turning to item No. 34, for the investigations of soils in cooperation with other branches of the department, other departments of the Government, and so forth, with an increase of \$30,000.

Mr. WHITNEY. I have Professor Marbut here who is in charge of soil surveys.

The CHAIRMAN. All right, Dr. Marbut, tell us briefly how you wish to use that \$30,000 increase.

# STATEMENT OF MR. CURTIS F. MARBUT, SCIENTIST IN CHARGE OF SOIL SURVEY, BUREAU OF SOILS, UNITED STATES DEPARTMENT OF AGRICULTURE.

Mr. MARBUT. Mr. Chairman, I have with me the financial statement for 1916 and a statement of the work done the same year, the latter shown by maps. Shall I display them?

The CHAIRMAN. You might do so and let the committee look at it.

Mr. MARBUT. The map of the United States shows the distribution of the work in the fiscal year 1916 [indicating on map]. The colored areas there [indicating], the darkened areas, represent counties. Those that are in solid black are counties which were begun and finished during the year. Those with shading are counties which were either begun in the preceding year and finished in 1916 or begun in 1916 and not finished. There was a total area of 38,671 square miles of detailed work completed during the year, and the area covered by reconnoissance surveys was 8,334 square miles.

This other map [indicating] shows the status of the survey at the present time in the United States. It shows by solid black color all areas surveyed in the United States from the beginning of the work—

Mr. HAUGEN. About what per cent does it cover?

Mr. MARBUT. Between 30 and 35 per cent of the total area of the United States.

The CHAIRMAN. All right, Doctor; you wish to use that \$30,000 for increasing your force and extending your surveys, I presume, do you not?

Mr. MARBUT. Yes, sir. There has been no increase in the appropriation for several years. I am not sure just when the last increase came, but for some three or four years we have been running on exactly the same per year. In the meantime we have been slightly increasing the area of work done, partly because of the increased efficiency of the men, but there is a continual increase in the demand for the work, coming now largely from the State experiment station officials. We are cooperating with some 20 States. We are not able to cooperate with them, however, to the extent that they desire. What I mean by that is that we are not able to do as much work in those States as they want done.

For example, the Georgia officials ask us every year to maintain several men in the State throughout the summer. We have not done it, because we could not. During the winter we keep more men there than in the summer time, but we have not been able to do for Georgia what Georgia wanted done. The same is true of Mississippi, Texas, and several other States. It is not necessary for me to name them all.

The CHAIRMAN. Doctor, you have named only Southern States as being interested in this proposition. Is the interest in this work confined largely to the South, or is it pretty widespread?

Mr. MARBUT. No; we are cooperating, I believe, with more States in the North than in the South. In the South we are cooperating with Georgia, Alabama, Mississippi, North Carolina, and Tennessee.

Mr. RUBEY. You mean by "cooperation" that those States are furnishing money to be used with the money we have been appropriating here?

Mr. MARBUT. They are appropriating money and expending that money in actual soil surveys, not as much in every case as we are spending, but they are spending all they can get for the soil surveys. In the North we are cooperating with New York, New Jersey, Pennsylvania, Ohio, West Virginia, Indiana, Wisconsin, Iowa, Nebraska, Washington, North Dakota, California, and Missouri.

The CHAIRMAN. Doctor, what amounts are the States expending in cooperation with you?

Mr. MARBUT. About \$78,000 a year. That is the nearest estimate that we have at the present time. We do not undertake to force the States to report their expenditures to us. There are a few States who have cooperated with us, to a limited extent, in the last year or two, for which we have no statement.

The CHAIRMAN. I think you furnished a detailed statement of that last year for the record.

Mr. HELGESEN. Do you do any work in States where they do not cooperate?

Mr. MARBUT. Yes; and one of the reasons for this requested increase is that it will enable us to do more work in the States with which we do not cooperate. We shall probably have to face a demand for increased cooperation in some States with which we are now cooperating, and also for cooperation in States with which we are not now cooperating. In North Dakota, Washington, Iowa, and New York the experiment-station officials are asking for increased appropriations for soil-survey work to be done in cooperation with us. The station officials of Minnesota, Virginia, Oregon, Kentucky, Oklahoma, South Dakota, and Texas propose to ask their respective legislatures for money to cooperate with us, none of them having cooperated in 1916 with the exception of a very limited amount in Kentucky. In Iowa, for example, a considerable increase for such work is being requested, and if granted we shall have to expend two or three times as much in that State as we have been expending for the last several years, if we meet them on equal terms.

Mr. McLAUGHLIN. Do the States do any work of their own independent of you?

Mr. MARBUT. None, except Illinois.

The CHAIRMAN. Pennsylvania does not?

Mr. MARBUT. No.

Mr. McLAUGHLIN. All the work, then, to which the State money is directed is in cooperation with you?

Mr. MARBUT. Yes, except in Illinois. We are not cooperating with Illinois, and we are not doing any work in that State. We surveyed one county some three years ago, but that is all that has been done by us in the State of Illinois for several years.

Mr. LESHIER. What practical use do the people back home, the farmers, make of this survey?

Mr. MARBUT. They do not make a great deal of use of it directly. The results do not serve their highest usefulness when placed directly in the hands of the farmer. It is made for the State experiment-station officials; it is made for men whose business it is to advise the farmer. It is not our business to advise him. It is our business to get fundamental information which can be used by officials whose business it is to advise him. The county agents and the experiment officials stand between us and the farmers.

Mr. HAWLEY. The ultimate purpose is the farmer?

Mr. MARBUT. The ultimate purpose is for the farmer, just as the ultimate purpose of a large part of the work in the Agricultural Department is for the use of the farmer, or, at least, for assisting



him; but the work of the soil survey is not as well adapted to being used directly by the farmer as by the advisory officials.

Mr. HELGESEN. What practical advice can the experiment stations give the farmers based on your work?

Mr. MARBUT. I will undertake to answer that in practically the same way I did last year. I do not know whether you asked the question or not, but some one did. The experiment station officials need to determine, for example, the best methods of handling a soil in order to get a maximum yield or quality of a particular kind of crop. In order to do this they make experiments with that crop on a great variety of soils, using the soil maps and reports for locating them. When the experiments show by their results the particular soil that will give the results sought, they determine the area of applicability of the results by the intelligent use of the soil map. The same procedure will apply to the determination of any other question which may arise as to the relation of soils to crops, methods of soil management, systems of farming, etc. They can not go all over a State and establish experiments on every man's farm. That is physically impossible. They can establish a few experiments on each of the predominant soils of the State and interpret the results through the soil survey.

Mr. RUBEY. Will not these soil surveys be of great benefit in farm demonstration work?

Mr. MARBUT. I thank you for calling my attention to that. I was going to mention the fact that Congress has appropriated within the last few years a great deal of money to be expended in advising farmers. County agents have been appointed in many counties in the United States. When they were first appointed, a year or so ago, we were flooded with requests for information about the soil. We were unable to give it in most cases, because we did not and do not have it. The calls have not come as rapidly since then as they did at first, because they know we can not give it.

Mr. DOOLITTLE. Is Kansas cooperating with you?

Mr. MARBUT. Kansas is not cooperating with us, but the State officials are very anxious to have soil-survey work done in the State. We received a letter from the president of the agricultural college less than two weeks ago asking if we could not do some work in Kansas next summer. Last year we had a letter from the professor of soils in the agricultural college asking if we could not survey the eastern half of the State of Kansas this last summer. We did not do any work in the State.

Mr. HAUGEN. How long ago was it since you adopted this half-and-half plan?

Mr. MARBUT. It is not a half-and-half plan. You mean cooperation?

Mr. HAUGEN. Yes.

Mr. MARBUT. It was not a thing that had to be adopted. It has been more or less in operation for some years and has been increasing as more and more States come in.

Mr. HAUGEN. What percentage of the total cost of the work is borne by the cooperating State?

Mr. MARBUT. It depends upon the State. Georgia keeps one man permanently employed in field work, and we keep, on an average,

two, I should say. In several of the States we maintain no more men than the States.

Mr. HAUGEN. It is just a matter of furnishing assistance and help?

Mr. MARBUT. Yes; and we do as much as we can. We come as near complying with their requests as we can, but in no State do we meet all the requests that come to us.

A few days ago the Farm Loan Board met in Washington. One of the members of the board stated that they expected to use the results of the soil survey as a basis for making loans. That will be possible only within the areas over which the soil survey has been extended.

Mr. HAUGEN. You mean one of the bases?

Mr. MARBUT. Yes; I mean that exactly—one only of the bases for making loans, though it is a perfectly legitimate and a fundamental basis.

The extension of advisory work over the whole United States, the passage of the farm loan act are two very important reasons why the soil-survey work should be extended within the next few years.

Mr. HAUGEN. Do other institutions loaning money make use of those surveys?

Mr. MARBUT. Yes. As a matter of fact, banks and real estate agents use our reports a very great deal, and especially the western banks engaged in farm loans.

The CHAIRMAN. This \$30,000 will allow you to put on how many additional surveyors?

Mr. MARBUT. It costs about \$2,000 a year to support a man in the soil survey on the lowest salary we pay—about \$1,080 per year.

Mr. HAUGEN. Do your men come in under the civil service?

Mr. MARBUT. Yes. We can count on at least 10 new men with this \$30,000, I think; possibly 12.

The CHAIRMAN. Your field force usually goes in threes or twos?

Mr. MARBUT. Twos; and in cooperating States we put in one man and the cooperating State one man.

Mr. HAUGEN. The making of a soil survey requires no special expert knowledge?

Mr. MARBUT. Yes; it requires a very great deal of special expert knowledge.

Mr. HAUGEN. I understood not.

Mr. MARBUT. It is absolutely necessary for a man to be an expert or else to develop expertness in order to get results that are reliable. The field man must be an expert on the determination of soil textures, must have at his fingers' ends a clear knowledge of all the varied criteria that go to make up a soil individual and distinguish it from another individual. If he does not possess this knowledge, no confidence can be placed in his results. Unless a man knows these many criteria he would not be able to distinguish one soil from another, except in those cases where the differences are great. To him soil differences do not exist in nature unless they exist already in his own mind.

May I be permitted to say one word more, Mr. Chairman?

The CHAIRMAN. Go ahead.

Mr. MARBUT. I want to put in a request just as strong as I can for the addition of that \$5,000 to the chemical appropriation. We need

that in the soil survey. Up to this time the soil survey has been doing its work mainly on the basis of field criteria. Until we had worked that up into such shape that its use became universal and the relative value of each kind was well established we were not in a position to make the best use of laboratory data. We have now passed that stage in our existence and are now in a position to utilize more and possibly stronger data. In the past our growth has been based on the assimilation and use of the data mentioned. In order to continue our growth in the future we need this additional information. It may be unfortunate that the scheme of creation did not include a well-matured plan for a soil survey, but it did not. It was necessary therefore for us to learn how to make one. We have been learning and I hope we shall continue to learn for a long time to come. I sincerely hope that we may be given the opportunity by the acquisition of this additional data. I hope the item will be granted.

**STATEMENT OF MR. MILTON WHITNEY, CHIEF OF THE BUREAU OF SOILS, UNITED STATES DEPARTMENT OF AGRICULTURE—**  
Continued.

The CHAIRMAN. Dr. Whitney, will you take up the next item, No. 35, on page 131, for \$18,100, which is no change at all?

Mr. WHITNEY. No. This is all right this time. That work is going on in a very satisfactory way.

The CHAIRMAN. You are simply called upon by the Forest Service in aiding them in selecting agricultural land?

Mr. WHITNEY. Yes.

The CHAIRMAN. I think the committee understands pretty well what this is.

Now, go to item 36, which is for general administrative purposes, and no change.

Mr. WHITNEY. No change.

The CHAIRMAN. That is rather a stationary appropriation, I imagine?

Mr. WHITNEY. Yes, sir.

The CHAIRMAN. I would like you to summarize your line of new work and submit a statement for the record.

(The statement referred to follows:)

**STATEMENT SUMMARIZING SOME OF THE RESULTS OF IMPORTANT FEATURES OF THE WORK OF THE BUREAU OF SOILS DURING THE PAST YEAR.**

The soil survey during the past fiscal year has identified the soils and mapped their distribution in an area of 47,000 square miles within the United States.

Correlative with the regular soil-survey work the alfalfa soils of the Piedmont region of the Southeastern States have been approximately mapped over an area of several hundred square miles, extending from Virginia to Alabama.

The relations of soils to truck crops in the northern Coastal Plain have been studied and their relative value for given crops, determined on the basis of existing use in regions of intensive trucking, has been ascertained with a view to the extended use of such preferred soils throughout the area of their distribution.

In the field of chemical investigations the bureau has continued to investigate the composition of soil types as an aid to the classification of soils by the soil survey; has completed an investigation of the lime compounds in soils and another



on the occurrence of the rare elements in plants grown on soils containing these rare elements; has continued investigation of the chemistry of the soil solution and made some important advances along this line; and has made a large number of chemical analyses of soils for other bureaus of the department.

At the Arlington Farm laboratory analyses of the raw mix and finished cement for cement mills in the United States producing more than 100 barrels a day are being made to determine the amount of potash volatilized at such plants. Results show that this will probably prove an important source of potash, and the attention of the companies is being called to the possibility of its recovery. Similar work on blast-furnace slags is now being undertaken. The problems of recovering potash from wool scourings and from natural brines are also being attacked.

At Arlington apparatus was installed and operated during the year for oxidizing by-product ammonia to produce nitric acid. This project was combined with a similar project undertaken later by the Bureau of Mines, the War Department, and the Solvay Co., of Syracuse, N. Y., one of this bureau's chemists and part of an apparatus being included in the cooperation plan. By-product ammonia as a source of nitrogen has been studied and several publications on this subject have been issued. Investigation of city wastes has been continued, and a full report is in preparation. Apparatus for the study of both the arc and the Haber processes of nitrogen fixation is now being installed.

An electric furnace has been operated at Arlington Farm smelting phosphate rock, and the phosphoric acid so produced has been collected with electric precipitators. This has resulted in the production of very high-grade acid, and it is hoped the process may prove of value in the development of the western phosphate beds, where freight charges make a concentrated product essential. Further work is being done to determine cost of production on a commercial scale.

Promising laboratory methods have been developed at Arlington for producing combinations of fertilizer ingredients, including ammonium-potassium-phosphate, potassium-phosphate, and ammonium-phosphate.

Plans are being perfected now for the erection of a factory on the Pacific coast for the purpose of studying the commercial production of potash and by-products from kelp.

(At this point the estimates of the Bureau of Biological Survey were taken up. The discussion will be found following the hearings on the Bureau of Entomology.)



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